4-2014

Diversity of Conventional Farming in Northeast Iowa: Why Do Farmers Farm the Way They Do?

Alice Topaloff
Iowa State University, topaloff@iastate.edu

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Abstract
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Disciplines
Agricultural and Resource Economics | Agriculture | Economics | Rural Sociology

Aerial view of contour stripcropping and fog-lined valleys in Winnneshiek County, Tim McCabe. 2011. Photo courtesy of USDA Natural Resources Conservation Service.

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The study was a special project of the Leopold Center Marketing and Food Systems Initiative conducted by intern Alice Topaloff, a master's student at the Paris Institute of Technology for Life, Food and Environmental Sciences in France. She grew up in Lecaude, a small town in Normandy, France.

LEOPOLD CENTER
April 2014

Introduction

Agricultural systems in the United States are diverse and dynamic, yet many still view conventional agriculture as a homogenous and stagnant system. As an agronomy student from France, I also had this misconception until I came to northeast Iowa to study agriculture. I received a grant from the Leopold Center's Marketing and Food Systems Initiative in the summer of 2013 to conduct a historical analysis of northeast Iowa's farming systems. The research showed that not only is there a great diversity of conventional farms in the area, but one can observe the varied evolutionary patterns and strategies that have contributed to the development of northeast Iowa's present-day farm structures. It is important to understand "why farmers do what they do" to fully understand the dynamics of rural living and agricultural life. Some data used in this paper relies on bibliographic information, but the bulk of the findings stemmed from more than 100 interviews conducted with farmers (active and retired) and other Iowans invested in agricultural life.

What follows is a case study of farm operations in northeast Iowa focused on the Upper Iowa watershed area. This region is unique because of the contrasts in its landscape. In the western part of northeast Iowa, the topography is extremely flat due to the presence of glaciers during the Wisconsin Glaciation Era (85,000-11,000 years ago) (6, 8). During that time, however, glaciers did not form in the eastern part of the area, resulting in a very hilly landscape (9, 10). Farmers have to work with the inherent characteristics of the land they farm, and this can be difficult. For example, crops cannot be grown on hills, because the risk for erosion is too great. Throughout this case study, it is clear that the type of farm operations in northeast Iowa is directly related to typology of the land.

The patterns of farm evolution in northeast Iowa are summarized in Figure 2 on page 8. The figure is a systemized breakdown of the agricultural history of the area, and is presented as a simplified decision-tree type graph. As each major event (economic crisis, major policy enactment, etc.) occurred, farmers have had to make decisions to adapt and stay competitive. The adaptation strategies are detailed throughout the paper. When you see the * sign in the following paper, it means the event or idea described is represented on the graph on page 8.

Figure 1. Aerial photography of northeast Iowa

Northeast Iowa before the 1930s

Native Americans populated Iowa for over 13,000 years before the first Europeans arrived at the beginning of the 19th century. In the second half of the 19th century (7), after buying land from the Native Americans for less than 4 cents an acre, the Federal Government distributed it through the Homestead Act and private sales. The Homestead Act offered free ownership of a quarter section of

land (160 acres) to any U.S. citizen. The land in northeast Iowa was evenly distributed toward the western part of the area, where the flat landscape allowed a regular grid to be drawn. In the eastern part of the area, the hilly landscape did not allow for a regular grid to be laid out, as seen in Figure 1. According to those who were interviewed, the Germans arrived with more capital, and were able to settle on the flatter lands. Norwegians settled by rivers and the Irish on the hills (1).By the mid-1920s, not only were farms generally bigger in the flat areas, but farm sizes also varied because of land transfers through marriages and inheritances.

Corn already was the main crop grown in Iowa, and wheat was abandoned because the high summer humidity reduced yields. Corn was grown in rotation with oats and hay ground (mainly clover). Manure for soil fertilization came from small herds of dairy cows (milked by hand) and small farrow-to-finish hog operations. All animals stayed on pasture during the day. The cows were brought in for the night and during winter, while hogs stayed in the pasture protected by small huts. Milk was taken to the town creamery and the excess whey was returned to farmers for use as hog feed. The crops produced on the farm were used to feed the livestock, so very few farmers produced crops for sale. Field work was done with the help of two- to six-horse teams depending on the power needed. When slopes were too steep to be cropped or pastured by cows, farmers raised sheep (who were capable of navigating steep inclines) for wool and meat (1). Women on farms were responsible for raising chickens for meat and eggs and tended vegetable gardens. In 1920, 95 percent of American farms raised chickens, whereas less than 1 percent did so in 2000 (12).

The Great Depression, President Roosevelt's New Deal and the agricultural revolution

The Great Depression hit the United States in 1929. The stock market crashed, the economy tumbled and farmers were forced to sell their products at a loss; hogs, for example, were sold for $4 a head (16). The farmers who were interviewed talked about the hardships their parents or grandparents endured during this time. However, interviewees noted that their families could at least produce food for their family as opposed to people who suffered from the crisis in the cities. Until this time in U.S. history, the Federal Government had played little part in controlling the economic markets. Farmers had benefited from easy access to land (Homestead Act) and beneficial loans, but President Roosevelt's New Deal was the first Federal plan that tackled agricultural economic issues.

During the 1930s the smallest and most indebted farms disappeared and were taken over by bigger and more productive farms; in Iowa the average farm size more than doubled between 1930 and 1950 (17). The Dust Bowl that hit the Great Plains in the 1930s led to the first conservation measures adopted by the government (Soil Conservation Act, 1936). Strip-farming was developed to control soil erosion and still is used in the hilly areas of the country (5, 13). The Rural Electrification Act (1937) brought electricity to most farms in northeast Iowa by 1940. This advance allowed farmers to have electricity in their barns and use milking machines and cooling systems for their dairy operations (5). Furthermore, American producers sold a lot of their products to European countries whose marketing and economic systems had been destroyed by World Wars I and II. This helped spur farm economic growth in the 1940s and 1950s. Farmers who had been exempted from the draft for wartime military service took on the responsibility of "feeding the planet," a concept that resonates yet today.

Technical progress led to great changes on the consumer and producer sides. Refrigeration systems were developed and supermarkets opened across the country. Improved food processing, transportation systems and farm specialization led to a decrease in food prices. As it became easier to buy food at the supermarket than to grow or raise it, America's food systems changed dramatically. On the producers' side, the agricultural revolution was in full swing. The farms in northeast Iowa first started using tractors in the late 1930s and all of them were using tractors instead of horses by the end of the 1940s (1). Tractors allowed farmers to plant more acres per worker. Other machines developed during the 1940s such as hay-balers and combines further

increasing productivity. Work productivity rose even faster than land productivity, while genetic and technical advances helped increase crop yields (17). Typical farms on the flat land in 1945 were between 125 and 300 acres (15). With the increase in productivity, permanent pastures were completely replaced by crops (corn/oats/hay rotation). In the hilly areas farms were on average half the size (75 to 160 acres) of flat land operations. Non-tillable land was maintained in permanent pasture. The price of wool dropped in the 1940s (16), so many farmers replaced their flocks of sheep with beef cow herds. Most northeast Iowa farms raised hogs to add value to their corn production. Sows were raised on pasture and piglets were weaned at 45 days old. Herbicides were developed in the 1950s and fueled the increase in popularity of soybeans. Until this point, significant weeding demands had made soybeans too labor-intensive to be worthwhile.

The 1960s and 1970s, the beginning of farm specialization *

In the 1960s laws regarding food sanitation became stricter, especially for dairy production. Milk was rated either A or B: grade A milk was produced following stricter rules and paid the producers a higher price than grade B milk. For dairy farmers, grade B milk was barely profitable to produce (1). Small town creameries gradually disappeared and bigger creameries began collecting milk only where the milk production was substantial enough (output from more than 15 cows). Farmers were encouraged to modernize their operations, first with refrigerated tanks and later with pipelines and larger stanchion barns. The increase in productivity and subsequent drop in milk prices left small dairy operations unable to compete.

Farms evolved depending on their resource base:

- If labor was the limiting resource on the farm,* the dairy herd was sold and the whole acreage was cultivated in a corn/bean rotation. Crops were sold or fed to a swine herd.
- If land was the limiting resource,* the farm focused on dairy production which created more added value per acre. This meant modernizing infrastructure and increasing the size of the dairy herd to stay competitive. Cows generally were raised inside as humid forage conservation techniques (silage) allowed farmers to cut hay up to five times a year. Since farm labor was focused on dairy needs, the hog operation was ended.

On the hills, farms had access to non-tillable land which was used as permanent pasture for either dairy or beef cows.

In the 1970s, high agricultural prices (16) created a secure economic environment that encouraged American farmers to expand their investments. During the early years of the decade farmers bought more powerful tractors and began using gestation crates in hog operations. This new farrowing system allowed one person to manage more sows, thus raising worker productivity. Land pressure increased, especially in the flatlands where farm revenue was typically generated by cash crops and directly linked to the number of acres farmed. Smaller farms (less than 250 acres) in the flatlands did not have enough acres to make the necessary investment in land acquisition. Many farms ceased being competitive and the land was bought by neighboring farms. Between 1969 and 1982, 20 percent of Winneshiek County farms disappeared (15). Urban jobs with stable wages and paid holidays became ever more attractive, accelerating the decrease in farm numbers (1).

The 1980s Farm Crisis*

In 1979 the price of land in Winneshiek County reached $4,500/acre (compared to $1,500/acre in 1965) (15). Farmers borrowed large amounts of money from banks to buy land and equipment. Unfortunately, the economic environment in the 1980s was quite challenging as a drop in exports led to a dramatic decrease in agricultural prices. Average farm incomes declined by 46 percent between 1980 and 1981 (5). The economic crisis slowed the increase in farm sizes and the price of land fell dramatically to $1,500/acre in 1985. Due to monetary inflation, banks increased loan interest rates to 18 percent which made it nearly impossible for farmers to pay back their loans. Farmers who had borrowed money from banks used their property as a guarantee, and since the

value of property dropped below the amount borrowed (in addition to interest rates), many farmers went bankrupt. Farmers on the flatland suffered particularly from this crisis because they had been more aggressive in adding to their holdings in what seemed to be a secure economic environment. Banks seized farmland and bankrupt farmers found jobs in town.

Farmers on the flatland who were able to survive the crisis (often those who had not invested as aggressively and had fewer loans) had opportunities to buy cheap land from the banks that had reclaimed farmland. This led to a second surge in farm size increases in the 1980s (15). Most farm families on the flatland had at least one family member take a job in town to bolster the family's income (1). Even though the crisis had greatly affected farm prices, industrial and urban jobs were not as severely impacted.

Farms on the hillsides suffered from the 1980s crisis in a different way. The topography of the land demanded different expansion strategies in the 1970s, and these farmers had been less aggressive than their neighbors on the flatland. As a result, fewer farms went completely bankrupt on the hills. The farm crisis also greatly affected hog prices (16). Hill area hog farmers who depended exclusively on income from hog sales abandoned hog production, found jobs in town and put their land in Conservation Reserve Program (CRP) contracts*. The CRP was a major component of the 1985 Farm Bill (5, 11). To enroll in the program, a farmer would sign a 10- to 15-year contract covering use of erodible land. The government paid rent ($60/acre) on the acres in the contract and the farmer committed to implementing conservation practices. This program had considerable impact, not only on lowering national crop production but also by setting a base land price. The recovery of world commodity prices allowed farmers to emerge from the crisis at the end of the 1980s. Bankrupt flatland farms were taken over by neighboring farmers. In the hill area, the only farms left were dairy and hog operations with more than 150 acres of tillable land and beef herds on permanent pasture.

Agricultural developments in the 1990s and impact on northeast Iowa farms

In the 1990s genetically modified organisms (GMOs) were developed for use in agricultural products. *Bt* corn and *RR* (Roundup Ready™) soybeans were released commercially in 1995. Even though farmers initially were reluctant to use these new products, within three years most were planting these seeds regularly (1, 2). The advantages were obvious: higher yields, less labor per acre and enhanced work productivity. Average corn yields in northeast Iowa exploded from 80 to 120 bushels/acre (17). GMO seeds also allowed use of low-tillage practices, since the herbicide can be applied at the same time as planting, which eliminated the need for pre-planting plowing.
Another interesting change in the 1990s was the development of hog corporations. Private corporations found hog production to be a quick, profitable business investment. They invested in heated and automated hog confinement facilities, buildings that were able to hold several hundred hogs. The heating in nursery buildings allowed farmers to wean piglets at around 21 days old (instead of the traditional 45 days). The private corporation usually provided everything (capital, land, inputs, etc.) except the labor, which was provided by local workers (usually farmers). These corporations were able to finish several thousand head of hogs a year. The development of this form of farming led to a national increase in hog production (4) and, consequently, a drastic drop in prices from $113 per hundredweight (cwt, equivalent to 100 lbs) in 1988 to $45/cwt in 1998 (16). Only a few hog operations managed to survive this massive price decline. In addition, many farms suffered from hog disease epidemics that wiped out entire herds and forced some farmers to quit their hog operation (1). Some family hog farms managed to survive both the price drop and the epidemics by specializing either in farrowing or finishing operations (**Hog operation**)*. Farmers who quit hog production found other strategies to make their operation profitable.

Farmers in the flat area adopted these tactics:

- Some farms were big enough to survive only on the income provided by their crop production (**Crop operation**)*.

- Smaller farms needed to create more added value per acre and did so by using their corn to feed out Holstein steers (**Small feedlot operation**)*.
- Farms that had access both to flat land and hilly permanent pasture used the pasture to raise stock cows and fed out the calves produced in their own feedlots (**Crop and feedlot operation**)*.
- A less common strategy was to set up a dairy goat herd, as the goat milk market expanded in the 1990s. Very few acres are required to feed a goat herd and most of the crop production could be sold. (**Dairy goat operation**)*.

Farmers in the hill area used the following strategies:

- Most of the farms compensated for the loss of hog income by adding or increasing an existing beef cow herd. Cows are on pasture from March to November and are fed fodder in the winter, which allows farmers to sell most of their crop production (corn and beans). The calves, born in the spring, are sold in the winter after being weaned (**Beef herd operation**)*.
- Smaller or heavily indebted farmers put their land in CRP contracts and took jobs in town. Since 2008 and the huge increase in corn prices, some farmers are taking their land out of CRP contracts gradually and using their old equipment or turning to custom hiring to return to crop production (**Crop lifestyle operation**)*.

Farmers who had specialized in milk production also underwent major changes in the 1990s. Milk parlors, free-stall barns and research in nutrition and genetics led to increases in milk production per cow and worker productivity (one person could handle more cows). The farmers who made the infrastructure investments increased their herd size. On a national scale, this meant more milk production and a decrease in prices from $25/cwt in 1989 to $17/cwt in 2000 (16). To maintain the same income, farmers were under pressure to increase their milk production by increasing the size of their herd. Different strategies used by dairy operations that invested in infrastructure were:

- On the hills, farmers had used permanent pasture as an asset. Their crop production limited the size of their herd which stayed around 100 head of cattle (**100 dairy cow operation**)*.
- On flat areas, farmers used new crop and conservation techniques to increase their crop production, and cows were never let out on pasture for yield and management reasons. These farms increased the size of their herd to around 250 head and hired additional labor. To compensate for the cost of employed labor, farmers started milking cows three times a day. This practice, coupled with the use of *Bovine somatotropin* (*bST*) hormones, increased milk production per cow by 20 percent (18) (**250 dairy cow operation**)*.

- When several members of the same family wanted to be part of the farm operation and use it as their main source of income, dairy operations expanded exponentially. The increased production allowed the farm to provide more income for more family members. These dairy operations now have around 1,000 cows and employ between 20 and 30 full-time employees. Often they are involved in genetic development, which offers another source of income (semen sales, embryo flushing, high genetic cow sales, etc.) (**1,000 dairy cow operation**)*.

Some small farmers continued milking their dairy herds (around 50 cows) with a pipeline in a stanchion barn. Even though milk prices decreased in the 1990s (16) some farms were able to stay competitive by minimizing costs, particularly on the hills where they could take advantage of their permanent pasture and lower feed costs (**Small Dairy Operation**)*. On the flat area, small dairy farmers were pushed to replace pastures with crops but could not compete with the bigger dairy operations. In response to the decline in milk prices, the government established a buyout program which allowed farmers to sell their dairy herd for a high price if they quit milking. One of the objectives of this program was to decrease national milk production resulting in an increase in milk prices. Many small dairy farmers stopped milking, with or without the help of the government

buyout program. They either started renting out their land to bigger farms or took advantage of their reduced work schedule (no milking chores) to do custom work for other farms (**Custom farm operation**)*.

On the hills, labor was the limiting factor for some dairy farms which necessitated a small herd size (less than 40 cows). These farmers added a beef herd that would add value to permanent pasture and demanded little maintenance time (**Mixed cow operation**)*.

High prices, aggressive expansion of cropland, need for Revenue Insurance in the 2000s

The Energy Policy Act of 2005 followed by the Energy Independence and Security Act of 2007 fueled the increase in corn prices by encouraging corn-based ethanol production (16). This led to different tactical choices by the farmers of **Crop operations** in the first decade of the 21st century. Some farmers pursued aggressive expansion strategies, farming more than 1,500 acres of crops, investing in enhanced equipment such as 22-row planters and 350 HP tractors (**PS Crop1**). The other crop farms stayed between 800 and 1,500 acres of crops and kept or invested in smaller equipment (**PS Crop2**). Since 2007, crop farmers have started purchasing precision equipment: tractors, combines and sprayers equipped with Global Positioning Systems (GPS). Farmers now can manage their plots with greater precision, adapting input application to the square inch using fewer inputs and achieving higher, more uniform yields. Since 2008, revenue insurance has been subsidized by the federal government. By paying around $30 per acre, a farmer is guaranteed 80 percent of the revenue received based on previous growing seasons (2, 14). This insurance provides protection both against yield losses or a drop in crop prices. Year after year, the increases in corn prices and the cost of fuel have led agribusiness companies to increase the cost of inputs (seeds, fertilizer, etc.) (16).The rising cost of inputs makes revenue insurance essential for farmers. Since 2011, almost every crop farmer in the area (other than organic) enrolled in revenue insurance programs for their corn and soybeans (1).

Economic and technological changes have greatly affected northeast Iowa farms throughout the past century. At the beginning of the 20th century, farms were relatively similar, both in size and development strategies. Agricultural development (machines, work productivity, etc.) and the economic environment led farmers to specialize in one kind of production during the 1960s. This was followed by a secure economic environment that led many farmers to invest and expand in the 1970s. The farm crisis of the 1980s shook up everything with harsh effects on farmers who had invested too much too quickly. The 1990s offered new technologies (GMOs, advanced equipment, GPS, etc.) that led to competitiveness among farmers by increasing productivity and lowering product prices. The recent increase in crop prices has once again changed everything, making crop farming a very profitable business. Changes happen quickly, if not brutally, in agriculture which is deeply affected by the world economy and technological improvements.

As this paper illustrates (and is shown in Figure 2), some farms were able to adapt their strategies to changing conditions (based upon topography) but many farmers did not stay competitive enough to save their operations. The most striking drop in farm numbers occurred since the 1950s (15). In Winneshiek County the number of farms dropped by 30 percent between 1969 and 1997 (15). Understanding where each farm type comes from, and why farmers do what they do, can help us anticipate the effects of certain changes: historical, economic, political, or even environmental. Apart from a few exceptions, most of the farms described now specialize in one type of production. Crop insurance has made the strategy of putting all the farm eggs in one basket a relatively secure option, but how sustainable are these strategies in the long term? A diversified farm needs more labor than a specialized farm. When corn prices rise, the difference in income generated makes specialized farming more attractive than diversified farming. For diversification to be attractive, more income has to be generated to balance the cost of extra labor.

This case study functions not only as a look at the past, but a glimpse of how we can frame our view of agricultural economics in the face of an uncertain future. Because of climate change, the evolving world economy, globalization, etc., the future is indeed uncertain. This case study illustrates how farmers have had to adapt faster and more drastically to stay competitive since 1960. It offers empirical evidence of how farms have adjusted to certain changes, and can give us an idea of how they might cope with comparable changes in the future.

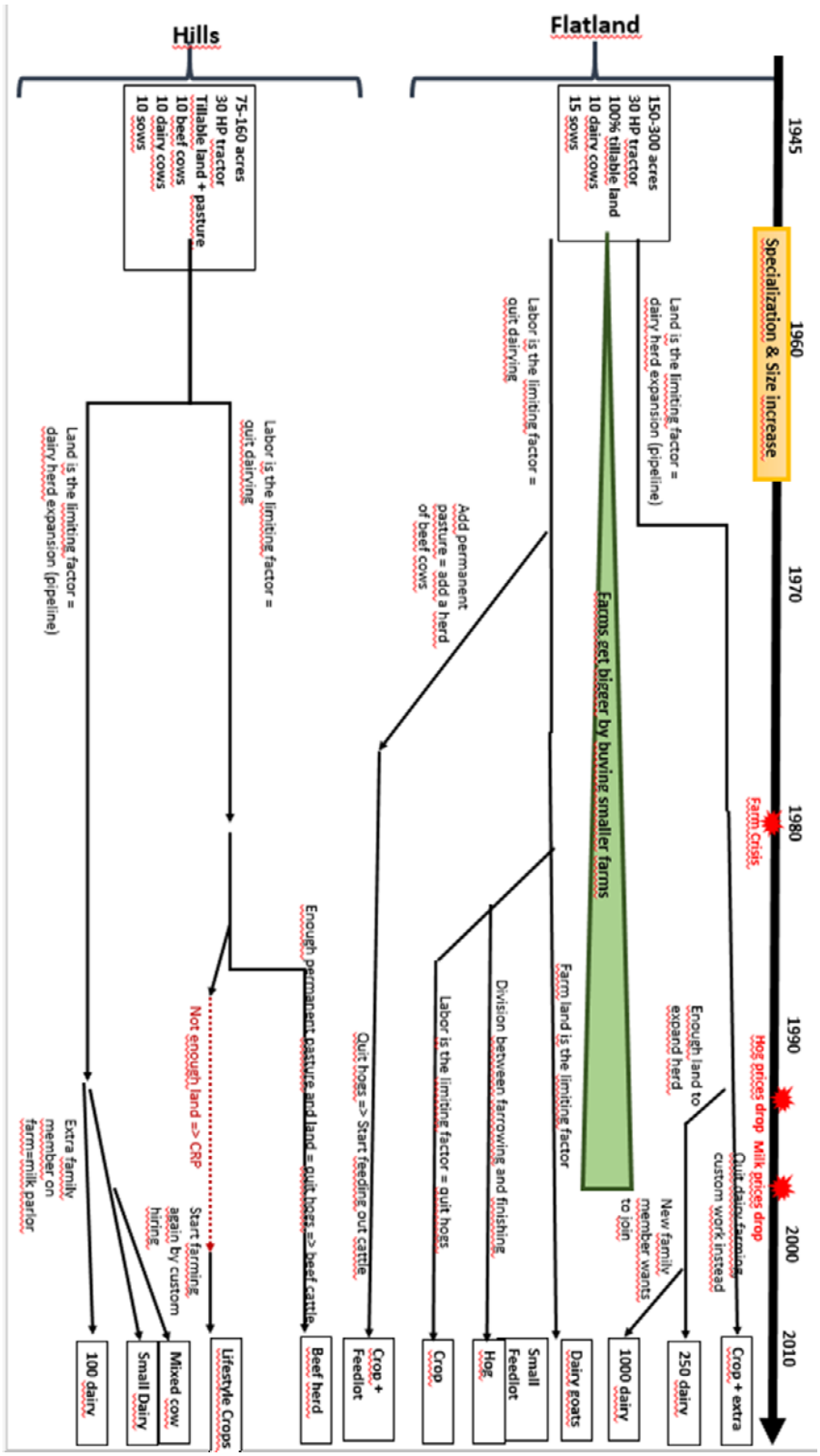

Figure 2. Patterns of farm evolution

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